

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
15 October 2020 (15.10.2020)



(10) International Publication Number
WO 2020/206554 A1

(51) International Patent Classification:

H01L 27/00 (2006.01) *H01L 31/18* (2006.01)
B82Y 30/00 (2011.01) *H01L 51/48* (2006.01)
H01L 29/92 (2006.01) *H01M 10/056* (2010.01)
H01L 31/053 (2014.01) *H02M 7/48* (2007.01)

(21) International Application Number:

PCT/CA2020/050482

(22) International Filing Date:

09 April 2020 (09.04.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/831,828 10 April 2019 (10.04.2019) US

(71) Applicant: **10644137 CANADA INC.** [CA/CA]; 30 Autumn Circle SE, Calgary, Alberta T3M 0J6 (CA).

(72) Inventors: **SCHERWITZ, Sam**; 30 Autumn Circle SE, Calgary, Alberta T3M 0J6 (CA). **PAHLEVANINEZHAD,**

Majid; 177 Rockyspring TC NW, Calgary, Alberta T3G 5Z7 (CA).

(74) Agent: **GOWLING WLG (CANADA) LLP** et al.; 421-7th Avenue Sw, Calgary, Alberta T2P 4K9 (CA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

(54) Title: HYBRID-ENERGY APPARATUS, SYSTEM, AND METHOD THEREFOR

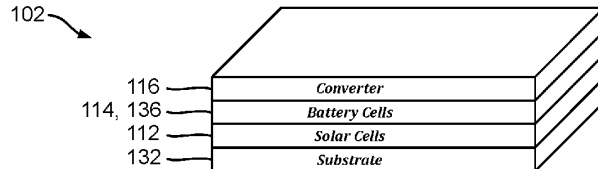


FIG. 6A

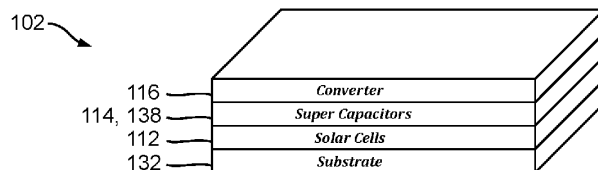


FIG. 6B

(57) Abstract: A multi-layer apparatus has a transparent or semi-transparent substrate, a solar-cell layer coupled to the substrate, an energy-storage layer coupled to the solar-cell layer, and a converter layer coupled to the energy-storage layer. The solar-cell layer has a plurality of solar cells for receiving light through the substrate and converting energy of the received light to a first electrical energy, the energy-storage layer has one or more energy-storage units for storing a second electrical energy, and the converter layer has one or more power converters electrically connected to the solar-cell layer and the energy-storage layer for receiving the first electrical energy and the second electrical energy therefrom and outputting a third electrical energy via an output thereof.

[Continued on next page]

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*